

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:) Confirmation No.: 4788
Yuji IWAKI et al.) Examiner: Michael H. Wilson
Serial No. 10/577,471) Group Art Unit: 1794
Filed: April 27, 2006)
For: COMPOSITE MATERIAL, LIGHT)
EMITTING ELEMENT AND LIGHT)
EMITTING DEVICE)

AFTER FINAL RESPONSE

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The Official Action mailed June 9, 2009, has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time. Accordingly, the Applicant respectfully submits that this response is being timely filed.

The Applicant notes with appreciation the consideration of the Information Disclosure Statements filed on July 27, 2006, and September 21, 2006.

Claims 1-9 and 11-26 are pending in the present application, of which claims 1-4, 8, 9, 13-16, 20 and 21 are independent. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

Paragraph 5 of the Official Action rejects claims 1-3, 5, 6, 8, 9, 11-15, 17, 18 and 20-26 as obvious based on the combination of U.S. Publication No. 2003/0218418 to Sato and U.S. Patent No. 6,084,176 to Shiratsuchi. Paragraph 6 of the Official Action rejects claims 1, 4, 7-9, 11-13, 16, 19-21 and 23-26 as obvious based on the combination of Sato and U.S. Patent No. 5,487,953 to Shirota. The Applicant

respectfully traverses the rejection because the Official Action has not made a *prima facie* case of obviousness.

As stated in MPEP §§ 2142-2144.04, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some reason to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims. The independent claims are generally directed to a composite material comprising or a layer including an organic compound and an inorganic compound, where the inorganic compound is an oxide of a transition metal. Specifically, independent claims 1-4 recite a composite material comprising an organic compound represented in the general formulas (1)-(4), respectively, and an inorganic compound, where the inorganic compound is an oxide of a transition metal. Independent claims 8 and 9 recite a composite material comprising an aryl carbazole and an inorganic compound, where the inorganic compound is an oxide of a transition metal. Independent claims 13-16 recite a light emitting element comprising a layer including an organic compound represented in the general formulas (1)-(4),

respectively, and an inorganic compound, where the inorganic compound is an oxide of a transition metal. Independent claims 20 and 21 recite a light emitting element comprising a layer including an aryl carbazole and an inorganic compound, where the inorganic compound is an oxide of a transition metal. For the reasons provided below, Sato and Shiratsuchi or Shiota, either alone or in combination, do not teach or suggest the above-referenced features of the present invention.

Sato appears to teach a hole-transporting layer 4 including aromatic diamenes, aromatic amines and/or spiro compounds (paragraph [0173]), and an anode buffer layer 3 which may include "metal oxides such as vanadium oxide, ruthenium oxide and molybdenum oxide" (paragraph [0212]) between the hole-transporting layer 4 and an anode 2. Sato does not teach or suggest that the "metal oxides such as vanadium oxide, ruthenium oxide and molybdenum oxide" from the anode buffer layer 3 could or should be added to the hole-transporting layer 4 including aromatic diamenes, aromatic amines and/or spiro compounds, or vice-versa.

Shiratsuchi or Shiota do not cure the deficiencies in Sato. Shiratsuchi or Shiota are relied upon to allegedly teach carbazole compounds (pages 4 and 6, Paper No. 20090527). However, the alleged combination of Sato and Shiratsuchi or Shiota, either alone or in combination, do not teach or suggest a composite material comprising or a layer including an organic compound and an inorganic compound, where the inorganic compound is an oxide of a transition metal.

Since Sato and Shiratsuchi or Shiota do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained.

Furthermore, there is no proper or sufficient reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Sato and Shiratsuchi or Shiota or to combine reference teachings to achieve the claimed invention. MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. It is respectfully submitted that the Official Action has failed to carry this burden. While the Official

Action relies on various teachings of the cited prior art to disclose aspects of the claimed invention and asserts that these aspects could be modified in the manner asserted in the Official Action, it is submitted that the Official Action does not adequately set forth why one of skill in the art would combine the references to achieve the features of the present invention.

The test for obviousness is not whether the references "could have been" combined or modified as asserted in the Official Action, but rather whether the references should have been. As noted in MPEP § 2143.01, "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art" (emphasis in original). KSR International Co. v. Teleflex Inc., 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007). Thus, it is respectfully submitted that the standard set forth in the Official Action is improper to support a finding of *prima facie* obviousness.

Without any specific references to Sato or Shiratsuchi or Shirota in support and without establishing the level of ordinary skill in the art at the time of the present invention, the Official Action asserts that "[i]t would have been obvious ... to add metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide to the hole transporting layer," that "[o]ne of ordinary skill in the art would reasonably expect such a combination to be suitable given material for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties vanadium oxide, ruthenium oxide, and molybdenum oxide are disclosed to have ([0211]-[0212])," that "[v]anadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]" and that "[o]ne of ordinary skill in the art would be motivated by a desire to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211] without forming additional layers" (pages 3-4 and 6, Paper No.

20090527). The Applicant respectfully disagrees and traverses the above assertions in the Official Action.

Rather than presenting reasons why one of ordinary skill in the art at the time of the present invention would have added the "metal oxides such as vanadium oxide, ruthenium oxide and molybdenum oxide" from the anode buffer layer 3 of Sato to the hole-transporting layer 4 including aromatic diamenes, aromatic amines and/or spiro compounds, or vice-versa, the Official Action instead appears to simply cite examples of desirable features of the hole-transporting layer 4, i.e. small ionization potential, high hole mobility and excellent stability, and advantages of the anode buffer layer 3, i.e. lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion. However, Sato does not teach or suggest that the desired attributes of the hole-transporting layer 4, i.e. small ionization potential, high hole mobility and excellent stability, would be improved by adding a metal oxide such as vanadium oxide, ruthenium oxide and molybdenum oxide, or that the advantages of the anode buffer layer 3, i.e. lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion, would still be achieved if the anode buffer layer 3 is combined with the hole-transporting layer 4. In other words, the Official Action has not provided a reasonable nexus from the prior art itself or within the level of ordinary skill in the art that would lead one to the conclusion that it was merely an obvious variation of Sato to add the "metal oxides such as vanadium oxide, ruthenium oxide and molybdenum oxide" from the anode buffer layer 3 of Sato to the hole-transporting layer 4 including aromatic diamenes, aromatic amines and/or spiro compounds, or vice-versa.

Also, Sato discloses the following (paragraphs [0211] and [0212]; emphasis added):

For the purpose of further elevating the efficiency of hole injection and improving the adhesion of the entire organic layer to the anode 2, an anode buffer layer 3 is interposed between the hole-transporting layer 4 and the anode 2 as shown in FIG. 3. ...

For satisfying these requirements, phthalocyanine compounds ...; organic compounds ...; sputter-carbon film ... and metal oxides such as

vanadium oxide, ruthenium oxide and molybdenum oxide ... have been heretofore reported.

Sato discloses usage of metal oxides as the material of the anode buffer layer. However, Sato does not disclose, teach or suggest that a composite material comprising an organic compound and an inorganic compound which is an oxide of a transition metal is used for an anode buffer layer.

In contrast, the specification of the present invention discloses one feature of the present invention, that is, a "layer formed of the composite material does not rise in driving voltage even if film thickness increases; therefore, optical design can be easily carried out, and reliability of a light emitting element can be improved" (original paragraph [0018], emphasis added). The organic compound and the inorganic compound in the composite material of the present invention can transfer electrons to each other. When transferring electrons between the organic compound and the inorganic compound, the driving voltage of the light emitting element is reduced compared to the case, as in Sato, where a buffer layer made of only metal oxide is used in a light emitting element.

As such, the Applicant believes that Sato fails to teach or suggest the possibility of the formation of a composite material comprising an organic material and an inorganic material, and a reason why one of ordinary skill in the art at the time of the present invention would mix the organic compound and metal oxides for an anode buffer layer.

Moreover, as noted in detail above, the Applicant believes that Shiratsuchi and Shirota, either alone or in combination, do not cure the deficiencies in Sato.

Therefore, the Applicant respectfully submits that the Official Action has not provided a proper or sufficient reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Sato and Shiratsuchi or Shirota or to combine reference teachings to achieve the claimed invention.

In the present application, it is respectfully submitted that the prior art of record, either alone or in combination, does not expressly or impliedly suggest the claimed invention and the Official Action has not presented a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

For the reasons stated above, the Official Action has not formed a proper *prima facie* case of obviousness. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized to charge fees under 37 C.F.R. §§ 1.16, 1.17, 1.20(a), 1.20(b), 1.20(c), and 1.20(d) (except the Issue Fee) which may be required now or hereafter, or credit any overpayment to Deposit Account No. 50-2280.

Respectfully submitted,



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